



UPVC ELECTRICAL CONDUIT & ACCESSORIES

Al Sagar Pipes Factory

IN TECHNICAL COLLABORATION WITH

Kalister TECHNOLOGIES LTD.

www.kalistergroup.com

WHO WE ARE

Al sagar Pipes Factory with technical collaboration **Kalister** is an amalgamation of the entrepreneurial vision, foresight and of our founders, who are each pioneers of their respective industries. We believe that close collaboration with our customers, the expertise of our employees, continuous innovation and outstanding quality.

We are primarily involved in:



PLASTIC PIPES
MANUFACTURING



GI CONDUITS
& FITTINGS



EARTHING & LIGHTNING
PROTECTION SYSTEM



CABLE TRAY AND
TRUNKING

An accumulated experience and association with multinational companies allows us to offer products and projects in international standards at very competitive rates. Many of our services have merited specific customer associates in terms of having exceeded customer expectations. This has enabled us to build enduring customer relationships; a fact reflected in the number of repeated orders from premier institution and major industries.

By working in unison with all our specialized division, strong project management competencies, commitment to implement, we ensure maximum value addition from our services and products.



PIPING SYSTEM



ELECTRICAL CONDUITS



UPVC DUCTS



HP PIPES



DRAINAGE

OUR PROFESSIONAL ETHICS

APPROPRIATENESS

We strive to see that the solution we provide is most appropriate and technically apt to the requirements of our clients.

SATISFACTION

Our efforts are always directed towards providing 100% comprehensive satisfaction to the clients in the work, in our dealing and in realizing their avowed dreams.

VALUE FOR MONEY

We acknowledge that the financial commitment made by our clients to the project is their serious pledge of purpose. As such, our goal is to give them full value for their money for now and for ever

MUTUAL RESPECT

We believe that the environment of mutual respect between us and our clients, consultants and vendors is plank of trust on which the progress is to be built

To be the most technically competent, client oriented, professionally managed engineering group in the Middle East.

CORE COMPETENCE PIPING SYSTEM



CONDUITS



The need for improved quality and reduced cost of wiring installations puts demands on all concerned in the project consultants to contractors.

Kalister conduit systems offer the expertise and facilities to handle these demands effectively and economically. We designed our conduits, slab boxes and accessories to create an integrated raceway system tough enough to meet the rugged day to day challenges of the construction industry.

Kalister PVC Non-metallic Tubes (Electrical rigid Conduits) are designed to use as Electrical cable / wire raceways. Protection is provided from dust, oil, dirt, water as well as a wide range of corrosive atmosphere.

Kalister Conduits and fittings set new standards in performance and aesthetic appeal. They are the natural choice for fast moving environments with versatility built in. Kalister offers Adapters, couplings, elbows, access fittings, boxes, cover plates, expansion fittings and spacers - Virtually any fitting required to complete the PVC Conduit system.

Innovation

Kalister Firm - Core PVC pipes have solid PVC inner and outer walls which enclose a cellular core layer. This technique offers good dielectric and thermal properties to suit electrical industries.

Kalister conduits are specifically designed for use in premise and rapid transit applications that require zero halogen content and flame retardance requirements. The Kalister conduit utilizes zero halogen compounds instead of chlorine and fluorine, minimizes acid generation when the product is exposed to a fire outbreak. This will minimize corrosivity which is harmful for very sensitive electronic equipments.

CONDUITS



PVC (POLY VINYL CHLORIDE)

IS A HYDROCARBON VINYL WITH CHLORINE TO MAKE UNPLASTICIZED PVC (UPVC), A RIGID PVC

FEATURES

- Firm core structure gives added die electric properties
- Self extinguishing PVC
- Standard Electrical Black
- Impact Resistant PVC
- Non Corroding
- Non Combustible 2 Hours (Optional)
- Fire Resistant
- Flexible enough to be bend by hand, yet tough enough to withstand crushing and breaking
- Smooth interior surface significantly reduces the amount of friction when pulling cables through long runs, even in runs with 90° bends.

STRENGTH

Kalister PVC Fittings offer both high impact and high tensile strength.

CORROSION RESISTANT

PVC is resistant to external corrosion and pitting and will not rust. This ensures a lower maintenance cost longer performance life.

NON CONDUCTIVE

PVC eliminates the most dangerous second point to contact in phase to ground faults. The use of separate ground conductor gives a complete and positive ground for the entire system.

CHEMICAL RESISTANT

Kalister conduit and fittings are resistant to a wide range of chemicals such as acids, alkalies, or salt solutions.

FIRE RESISTANCE

As a building material PVC offers outstanding performance characteristics. PVC will not burn unless an external flame source is applied, and will not sustain ignition once the flame source is removed. Kalister PVC conduits and fittings has a flash ignition temperature of 850° F

CONDUITS



SPECIFICATION

Electrical Round Rigid Conduit & Fittings

●	Product Name	Kalister UPVC Conduit Systems
●	Application	Conduit for LV Systems, Electrical Power & Light, Data, Telecommunication, used in Building wiring
●	Length	2.9m / 3m
●	Colour	Black / White
●	Manufactured according to	BS EN 61386-1/21 Latest Standard, UL 746 C (1998 - 07), IEC 670 (1989-07), IEC 670/A1 (1994-7), BS EN 50086-1, BS EN 40086-2-1/A11, BS EN 60423, BS EN 50102/A1, BS EN 60112, BS EN 6099, SC: 2.2, IEC 6142-2 MEW R1/S1 KWS GSO 33,32
●	Manufactured to meet	UL 1653, NEMA TC-13
●	Chemical Name	Base Resin: Co Polymer Resin PVC

APPLICABLE STANDARD

Comply with the requirements of BS 4607 Parts 1 & 5 KSS 230 & 231 of 1996 - BS EN 61386 - 1/21, MEW R1/S1

Properties	Value	Unit
Density	1.4 - 1.45	g/cm ³
Vicat Softening temperature	80 - 91	°C
Cost-efficient of linear thermal expansion	$\leq 0.8 \times 10^{-4}$	K ⁻¹
Tensile Strength	500 -550	Kg/cm ²
Compression Force	320, 750, 1250 (BS EN 61386-1)	N
Impact Strength	Heavy, Medium and Light (Comply with BS EN 61386-1)	
Dielectric Strength	2000	Volt
Insulation Resistance	>100	MΩ

CONDUITS

HEAVY GAUGE ROUND CONDUIT (LENGTH 2.9/3M)

High Duty

Cat No	Size OD	Wall thickness in mm	Standard Packs	Total mtr/pack
20 CHG	20 mm	1.9	50	150
25 CHG	25 mm	2.0	25	75
32 CHG	32 mm	2.5	20	60
38 CHG	38 mm	2.5	20	60
50 CHG	50 mm	2.5	15	45

MEDIUM GAUGE ROUND CONDUIT (LENGTH 2.9/3M)

Medium Duty

Cat No	Size OD	Wall thickness in mm	Standard Packs	Total mtr/pack
20 CMG	20 mm	1.55	50	150
25 CMG	25 mm	1.8	25	75
32 CMG	32 mm	2.1	20	60
38 CMG	38 mm	2.2	20	60
50 CMG	50 mm	2.2	15	45

LOW GAUGE ROUND CONDUIT (LENGTH 2.9/3M)

Low Duty

Cat No	Size OD	Wall thickness in mm	Standard Packs	Total mtr/pack
20 CLG	20 mm	1.3	50	150
25 CLG	25 mm	1.5	25	75
32 CLG	32 mm	1.6	20	60
38 CLG	38 mm	1.6	20	60
50 CLG	50 mm	1.8	15	45

Note: For Heavy gauge pipes with sizes 20x1.8 mm, 25x1.9 mm, 50x3.2 mm (produced upon request)

Yellow (Special) : Lies within the requirements of British/ European standards but of light gauge. (Compression force 320 N)

Blue (General) : Lies within the requirements of Kuwaiti and British / European standards but of medium gauge. (Compression force 750 N)

Red (Standard) : Lies within the requirements of British / European standard and Ministry of Electricity and Water - Kuwait but of heavy gauge. (Compression force 1250 N)

The 38 mm Conduit has been produced by Al-Sager to MEW specifications.

ACCESSORIES

UPVC CONDUIT ACCESSORIES

Comply with the requirements of BS 4607 parts 1 & 5 KSS 230 & 231 of 1986. BS EN 61386 1/21



Adaptable Box

75mmx 75mm (AB) for one, angle, through, three and four way entries of diameters (20, 25, 32, 38 mm)



Surface Switch Box

87x87x32 mm (SSB) provided with 20 mm knock-out on opposite sides)



Adaptable Box

110mm x 110mm (AB) For one, angle, through, three and four way entries of 20, 25, 32, 38 and 50mm diameter.



Surface Switch Box

Double (SSBD), 145x86x32 mm



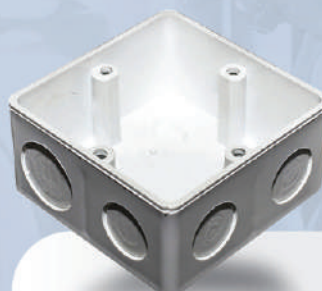
Two Gang Switch Box

(2GSB) provided with 20mm knock-outs.



Bends (BE)

SIZE:
20 mm | 25 mm | 32 mm
38 mm | 50 mm



One Gang Switch Box

(1GSB), 75mmx 75mm provided with 20mm knockouts)

ACCESSORIES

CIRCULAR JUNCTION BOXES

Available in sizes of 20 and 25mm



LOOP -IN

ITEM CODE	SIZE
CLB 20	20mm
CLB 25	25mm



ANGLE

ITEM CODE	SIZE
CBA 20	20mm
CBA 25	25mm



U-WAY

ITEM CODE	SIZE
CBU 20	20mm
CBU 25	25mm



TERMINAL

ITEM CODE	SIZE
CBTR 20	20mm
CBTR 25	25mm



TEE

ITEM CODE	SIZE
CBT 20	20mm
CBT 25	25mm



Y-WAY

ITEM CODE	SIZE
CBY 20	20mm
CBY 25	25mm



THROUGH

ITEM CODE	SIZE
CBTH 20	20mm
CBTH 25	25mm



INTERSECTION

ITEM CODE	SIZE
CBI 20	20mm
CBI 25	25mm



H-WAY

ITEM CODE	SIZE
CBH 20	20mm
CBH 25	25mm

ACCESSORIES



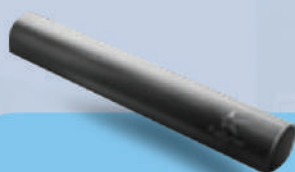
COUPLERS (CC)

SIZE

20mm
25mm
32mm
38mm
50mm



REDUCER (CR)
SIZE 25X20MM



EXPANSION COUPLERS (ECC)

SIZE

20mm
25mm
32mm
38mm
50mm



CIRCULAR LIDS (CL)



FEMALE ADAPTOR (FA)

SIZE

20mm
25mm
32mm
38mm
50mm



SQAURE LIDS (SL 2B)
WITH TWO FIXING POINTS
FOR 1 GANG SWITCH BOX



SADDLE, BASES & SCREWS (CSBS)

SIZE

20mm
25mm
32mm
38mm
50mm



CIRCULAR EXTENSION RING (CER)
12.5MM, 35.0MM

Originally the fittings are in black colour, white colour will be manufactured upon request. Any other requirements not mentioned in the catalogue, please refer to sales in-charge.

INSTALLATION



INSTALLATION INSTRUCTIONS

HANDLING AND STORAGE

1. Care should be exercised to avoid rough handling U-PVC Electrical conduits and fittings. They should not be dragged over sharp objects or projections, dropped or have objects dropped upon them.
2. Transportation by truck will require that the conduits will be continuously supported along its length and all sharp edges on the truck bed that could come in contact with the pipe must be padded.
3. Conduits should be stored on levelled ground which is free of any sharp objects. If different thickness are stacked together, the thickest conduits should be on bottom. They should be stacked not more than 2.0 m height. If the conduits are stored in racks, it should be continuously supported along its length.
4. The conduits should be protected from the direct sun light and to be put in an area with good ventilation.
5. Fittings must be stored in their original cartons to keep them free of dust reduce the possibility of damage and must be stored inside shaded store.
6. Solvent cement and cleaner must be stored in a cool area (below 25°C). Because of their flammability they must not be exposed to ignition, heat sparks or open flames.
7. Solvent cement have definite shelf life, each can should be clearly marked with date of manufacturing at the bottom side of the can.

JOINTING PROCEDURE

U-PVC electrical conduits can be joined together or with fittings by means of solvent cementing method, providing a chemically fused joint.

SOLVENT CEMENTING PROCEDURE

1. The solvent cement we recommended to be used for joining Electrical conduits with fitting is HEXA Link.
2. The conduit must be cut off at right angles.
3. The outside surface of the conduit and the inside surface of the fitting must be cleaned from any obvious dirt by dry and clean cloth. It should be dry before the solvent cement is applied.
4. A full layer of solvent cement is immediately applied to the conduit end equal to the depth of the fitting's socket.
5. A medium layer of cement is then applied to the conduit or fitting socket. The cement should not puddle wherever a socket is cemented, the area beyond the socket should not be coated with cement and it should not be allowed to run down in to the inside of the conduits or fittings.
6. The two parts must be assembled quickly and while the cement is still fluid, they must be held in one position without movement for a short while (30 seconds) until initial bonding has taken place.
7. To avoid overheating in summer temperatures, the jointing area must be protected from the sun light. At high temperatures, the cementing procedure should be completed within 2 minutes. In summer, it is recommended to start cementing in the early morning hours.
8. The excess bead and cement from juncture of conduit and fitting must be wiped off with a clean cloth.

INSTALLATION

INSTALLATION

Kalister raceways, fittings, boxes, and accessories shall be installed in accordance with Article 362 of the 2002 National Electric Code. Where conduit penetrates a fire rated wall, floor or ceiling assembly, an approved fire stop system as listed in UL Building Materials directory or other nationally recognized testing laboratory shall be used.

ASSEMBLY

Join PVC fittings with PVC Conduits by solvent cement. After cutting PVC Conduit, sharp edges or burrs from inside the conduit should be removed with a knife. Thoroughly clean the end of the pipe and inside the fitting with a pipe cleaner. Apply a generous amount of solvent cement to both surfaces, slide together and give a quarter turn to ensure solvent is spread evenly on the material. Hold together for a few seconds until the joint is made.

EXPANSION AND CONTRACTION

All conduit pipe and fittings expand and contract with changes in temperature. "All material expansion and contraction rates are represented by coefficients of thermal expansion.

A general rule of thumb is that for every 37.8c temperature change in a 30.5mtr run of PVC conduit; the conduit will undergo 9.2cm of expansion or contraction.

Using the following equations:

$$\Delta L = L \times \Delta t \times \alpha$$

where

$$\Delta L = \text{Change in length}$$

$$L = \text{Length of route}$$

$$\Delta t = \text{Change in temperature between installation ambient temperature and the highest or bit temperature after installation}$$

$$\alpha = \text{Factor for expansion or contraction which is } 0.08\text{mm/C}^\circ/\text{m} \text{ for UPVC} \\ (\text{Coefficient of thermal expansion})$$

USE OF EXPANSION JOINTS

In installations where the expected temperature variation exceeds 15c°, expansion joints must be used. An expansion joint consists of two tubes, one telescoping inside another. When installing expansion joints alignment of the piston and barrel is important. Straps should be placed approximately each 30cm on either side of the joint to ensure that any movement is directed squarely into the joint.

INSTALLATION

When expansion joints are required the following steps should be followed:
The expansion joints should then be installed at even intervals throughout the run.

$$\text{Number of joints} = \frac{\text{Total expansion}}{4}$$

DETERMINE PISTON OPENING

The expansion joint must be installed to allow both expansion and contraction of the conduit run. Because installation temperatures may vary, the piston setting must be determined. The correct piston opening is determined using the following formula:

$$\text{Piston (mm)} = \frac{\text{max temperature } ^\circ - \text{installing temperature } ^\circ \times 4}{\text{Temperature change } ^\circ}$$

LOCATION OF EXPANSION JOINTS

Proper functioning of an expansion joint depends in three procedures:

- The correct placement of the expansion joint.
- The proper installation of rigid PVC conduit and the expansion joint.
- The proper placement and fastening of support straps.

ONE EXPANSION JOINT

Of only one expansion joint is needed between two boxes, the barrel of the joint should be rigidly fastened close to the first box. Rigid PVC conduit should then be loosely supported with straps, allowing the conduit to move freely as it expands and contracts.

TWO EXPANSION JOINTS

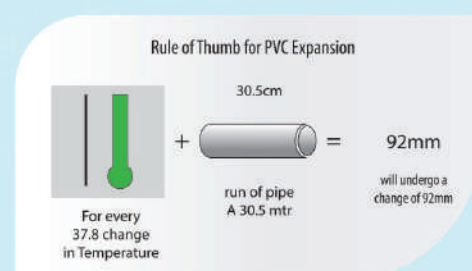
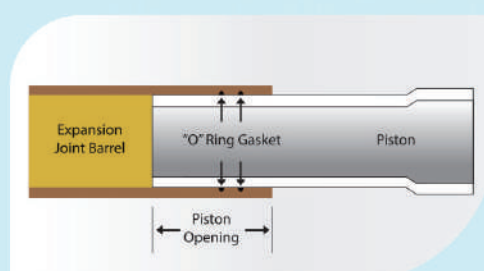
If two expansion joint are needed, the joints should be firmly fastened back to back at the center of the run. Rigid PVC conduit should be loosely supported with straps, allowing the conduit to move freely as it expands and contracts.

TWO EXPANSION JOINTS (ALTERNATIVE)

Alternatively, the center of the run and two expansion joints (located at the boxes) should be rigidly fastened. All other support straps should be loosely fastened.

THREE OR MORE EXPANSION JOINTS

If more than two joints are needed in a very long run, they should be put in a series, one after the other. Each barrel must be rigidly fastened while conduit is loosely supported with straps allowing the conduit to move freely as it expands and contracts. When installed in a series, each section acts independently of the other. Spacing of conduit supports must be in accordance with NEC article 347-8.



RECOMMENDED PRACTICE

Kalister non-metallic conduits are so constructed that it will be possible to bend the conduit easily with the aids of bending spring and all conduits and conduit fittings are of unthreaded type. The number of single core, PVC insulated non-sheathed cables run in one conduit shall be such that it permits easy drawing of the cables. The actual number of cables drawn into any conduit shall not be greater than the number given in the appropriate table. where different sizes of cables are drawn into a conduit, the number and sizes of cables installed shall be selected in accordance with the method detailed in tables. A separate insulated earth wire shall be drawn into all rigid non-metallic conduits.

CAPACITY OF CONDUITS

TABLE 1

Capacity of conduits for simultaneous drawing of single core PVC insulated cable for a straight run upto 10m without bends.

Nominal cross sectional area of conductor	Size of Conduit (mm)				
	20	25	32	38	50
1.5	11	-	-	-	-
2.5	8	-	-	-	-
4.0	5	10	-	-	-
6.0	4	7	13	-	-
10.0	2	4	7	10	-
16.0	2	3	6	9	-
25.0	-	2	4	5	10
35.0	-	-	3	4	7
50.0	-	-	2	3	5
70.0	-	-	-	2	4

CAPACITY OF CONDUITS

TABLE 2

Capacity of conduits for simultaneous drawing of single core PVC insulated cable for a run upto 10m without 1 bend.

Nominal cross sectional area of conductor	Size of Conduit (mm)				
	20	25	32	38	50
1.5	8	-	-	-	-
2.5	6	-	-	-	-
4.0	4	8	-	-	-
6.0	3	6	11	-	-
10.0	-	3	6	8	-
16.0	-	2	5	7	12
25.0	-	-	3	4	8
35.0	-	-	2	3	6
50.0	-	-	-	2	4
70.0	-	-	-	-	3

TABLE 3

Capacity of conduits for simultaneous drawing of single core PVC insulated cable for a run upto 10m with 2 bends.

Nominal cross sectional area of conductor	Size of Conduit (mm)				
	20	25	32	38	50
1.5	6	11	-	-	-
2.5	4	8	-	-	-
4.0	3	6	-	-	-
6.0	2	4	8	11	-
10.0	-	2	4	6	10
16.0	-	2	3	5	9
25.0	-	-	2	3	5
35.0	-	-	-	2	4
50.0	-	-	-	-	3
70.0	-	-	-	-	2

TABLE 4

Cable factor

Nominal cross sectional area of conductor mm ²	1.5	2.5	4.0	6.0	10.0	16.0	25.0	35.0	50.0	70.0
	22	30	43	58	105	121	193	253	342	451

TABLE 5

Conduit Factor

Conduit Size mm	16	20	25	32	38	50
Upto 10mm without Bend	150	244	442	783	1092	1943
Upto 10mm with one Bend	120	196	358	643	883	1571
Upto 10mm with Two Bend	86	141	260	474	646	1149

For each size of cable it is intended to use, obtain the appropriate factor from Table 4. Add all the cable factors so obtained and compare with the conduit factor given in Table 5. The conduit size which will satisfactorily accommodate the cables is that size having a factor equal to or exceeding the sum of the cable factor.

CORRUGATED CONDUIT



PRODUCT

- Liquid tight raceway
- Component, extra-flexible non-metalic mechanical protection tubing
- Corrugated flame resistant PVC with integral reinforcing member.
- Non-conductive raceway
- Impact resistant UV stabilised PVC Corrugated conduit

TEMPERATURE RATING

- 60°C Dry
- 60°C wet and Oily

APPLICATIONS

- Recognized component for use in protection of insulated wire in assemblies or consoles of electrical apparatus.
- Non-UL liquid tight raceway.

REFERENCES & RATING

- Recognized component Liquid tight Mechanical Protection Tubing under UL file Number E79977
- Designed to BS4607 & IEC423

Code	Size (mm)	Coil Length (m)	Bend radius (mm)
SFC 12	12	50	12.25
SFC 16	16	50	15.75
SFC 20	21	50	20.75
SFC 25	27	50	27.50
SFC 35	35	50	35.00
SFC 40	41	50	39.75
SFC 50	53	50	51.00

NB: All dimensions and are subject normal to manufacturing tolerances.

CONSTRUCTION

Superflex conduit has a circular cross section with a smooth polyvinyl chloride (PVC) inner surface and an integral reinforcing member within the conduit wall.

GROUNDING

Where applicable a separate grounding conductor is required for all trade sizes

MARKINGS

The product marking is contained on the outer carton.

SPECIFICATION



DESCRIPTION

- Recognized component extra flexible non-metallic mechanical protection tubing and
- Non-UI Extra - Flexible Non-metallic conduit

Starflex® Non Metallic Corrugated conduit designed for use in connection with the support of and insulated wires, placed within the conduit that are used to interconnect separate component assemblies console of electrical apparatus.

The acceptable use of this material is limited to the following conditions:

1. Starflex® conduit may be used for the routing of internal wiring between electrical components of electrical equipments. The protection afforded to the internal wiring by the tubing may be considered equivalent to the protection afforded the internal conductors by the jacket of a Type SJT flexible cord.

- Starflex® conduit is suitable for use at a maximum temperature 60°C.
- Starflex® conduit shall be terminated at each end of the console or appliances to which connected to provide strain relief to withstand a 30-pound pull for 1.0 minute. Fittings available from us meet this requirements.
- The percent fill of the conduit with conductors shall not exceed 75% where percent fill is defined as : $\text{Percent Fill} = \frac{\text{Area of Enclosed Conductors} \times 100}{\text{Internal Area of Tubing Fill Factor}}$.
- The minimum bend radius shall not be less than the outside diameter of the conduit.
- The manufacturer's fittings were subjected to the Oil Spray Test in accordance with international standards.

Starflex® conduit is designed for use in wet, dry or oily locations as a flame resistant, non metallic raceway for power, control and communications cables. The product is intended for use at 60°C (140°F) in a dry location, 60°C (140°F) in a wet location and 60°C (140°F) in oily location. It is sunlight resistant.

CERTIFICATES



APPROVALS



MINISTRY OF
ELECTRICITY AND
WATER



MINISTRY OF
COMMUNICATIONS



MINISTRY OF
PUBLIC WORKS



MINISTRY OF
EDUCATION



MINISTRY OF
INTERIOR



PUBLIC AUTHORITY OF
ROAD AND
TRANSPORT



PUBLIC AUTHORITY FOR
HOUSING AND
WELFARE



KUWAIT
UNIVERSITY



Kuwait Oil Company



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